THE MONEY VALUE OF AN INVENTOR.

In the year 1847 an article entitled "Human Progress" appeared in the "Westminster Review." A portion of it was a criticism on Lord Ashley's endeavour to find work for needlewomen, and it was pointed out that the true remedy was to dispense with the needlewomen, as mere stitchers, or altogether by constructing machines to do their work, and ultimately to dispense with the machines also, by the construction of other machines to produce seamless garments direct from improved looms. The writer pointed out that so long as degrading work existed, so long would degraded human beings be found to perform it, but that the degrading work ceasing the degraded humanity would disappear also. The writer thought the stitching-machine a new idea, but while correcting the press an American gentleman, looking over it, remarked, "Are you aware that a stitching-machine has just been invented in the United States?" Upon which the writer "made a note of it" at the foot of his page. "It is a question for the mechanician to solve how the powers of Nature shall produce human garments by machinery wholly and not in part? The problem will not be difficult to solve; and he who first solves it shall be famous among men, as the chemist who shall first discover the mystery of the aromas. Then may men and women indulge in artistical decoration of their persons when it shall cease to be a result of painful handicraft."*

Through good and through evil the inventor worked on, and slowly his invention got into use, and it was patented in England and other countries.

It has been stated that the inventor, Mr. Howe, had realised upwards of 150,000*l.* by patent right on his machines in the United States, but, notwithstanding, he applied for an extension of the term of his patent, and obtained it for another seven years.

The ground on which the grant was obtained is as follows:—An invention is not to be regarded as ordinary labour, nor is its value to be measured by arbitrary rules. The utility and value to the community are the true test by which to judge of the invention, and the inventor's reward should be proportional to its value.

Mr. Howe invented a labour-saving machine, by which an enormous amount of miserably-paid drudgery was removed from all those operations involving the clothing of the community, and every item involving the joining of materials by sewing. And, moreover, in a country of insufficient labour, the amount of work required could not have been supplied, and great numbers must have been deprived of the needful supply.

The value of the sewing done by Mr. Howe's machines at the present time in the United States is at the least *fifty-eight millions of pounds sterling per annum*, and, if the original machines were used without the improvements, the value would amount to *thirty-four millions of pounds sterling per annum*. In the city of New York, the value is *one million and a half per annum* on men and boys' clothing, *ninety-two thousand* on hats and caps, and *one hundred and seventy thousand* on shirt-fronts; and in Massachusetts the labour saved in boots and shoes amounts to *one million and a half per annum*.

Surely this man is a benefactor not only to his own community, but to the other nations in which his machines are used. In fourteen years the value of this invention rises to something like the whole of our National debt, and considerably more than the whole sum invested in our railways in the course of thirty years.

The Commissioners of Patents in the United States have given the inventor a seven years' further right. In England the practice has been to grant renewal only in case of no profit having been made by the invention. If it can be shown that the inventor has received any sum, from a thousand pounds or so upwards, he has very little chance of renewal. And, moreover, the cost of the application amounts to so considerable a sum, that a poor inventor would have little chance of finding it, more especially as the cost increases by the opposition, supported commonly by the clubbed purses of manufacturers,—men not usually imaginative, and who recognise the work done upon matter, but not the work of mind, and still less the value of that perception and judgment which discerns utility and profit in embryo. The inventor points out the work that is hidden; he is the discoverer of the unknown mine. He is first scouted as a "schemer," and has trouble to introduce his idea; and when the thought of the mind has grown to be the work of the hand, he is commonly denounced as a robber.

We believe that an application is about to be made for a renewal of Mr. Howe's patent in England, and painful and humiliating to us as a nation will it be, if it fails. But it will probably not fail, for the reason that public attention is now called

* While writing this we are informed that an American has brought over a "stitching machine." This is the first step. The next is to manufacture garments not requiring stitches. The artist and mechanician must combine for this.

to the morality of the question. Our House of Lords is quite as moral as any institution of our American cousine, and it is prohable that for tho first time the question will be argued on its merits, and not upon the technicalities of routine. The part that an inventor plays in national progress will be taken into the account, and his services will not be measured at the rate of a foreman or inspector in a national dockyard or arsenal, or any other of the underpaid classes of public servante.

Rightly understood, this question of recompense to inventors is of the deepest national importance; and by the term inventors I do not mean merely machiniste or chemiste, but the general body of original-minded men who really create national progress—who are the chiefs and leaders marshalling the works of those following.

Thie England of ours stands out from amidst Continental troubles, in virtue of the fact that more than in any other country all men are equal before the law. Every man, according to his faculties, may rise by industry and perseverance; and if genius, persoverance, and favourahle circumstances meet together, a day labourer may attain to any position under the Crown. In virtue of this conviction, all men are contented, because the door is opened for bettering their poeition, and lord and lout dwell together in harmony, and the lout is content, having few aapirations. But amongst the mass of both are to be found many individuals with high instinctive genius and original powers. Theso men look round the world and find that nearly all matter possesses owners, land and water, and bird and beast, and fish, and tree and plant, and minerals. Air and ocean alone are free to all. In their teeming brains they behold new powers into which matter may be shaped, new combinatione of choice art; but the materials on which they must work are not theirs, and if they give forth tbeir knowledge the holders of the materials will alone benefit by the wonder-working hrain. The lord of the soil would be the lord of all things, and the owner of tbe originating hrain would be only a slave. Bethlem Gabor imprisoning the alchemist, in the romance of St. Leon, was a type of this condition.

Had this condition of things existed in England, one of two things must have resulted. Either the men of brains would have tried conclusions with the lords of the soil, by incessant revolutions, or England would have remained in a condition of non-progress, to be appropriated by successive invaders.

Fortunately English rulers and law-makers nnderstood this, and laws were made giving men a limited property in their inventions, in consideration of their promulgating them. It is true that the inventor had to pay hlack mail to the king for the time being, but genius thus obtained its fulcrum, and national progress followed. The prosperous inventor obtained the means of purchasing the land of the spendthrift, and founding a name.

Of late years thers has been a disposition in England to decry pateute, the decriers heing in almost all cases rich men—capitaliste desirous of obtaining the use of other men's hrains gratuitously. Could they be successful in taking away copyright from authors, and property in mind from inventors, it would simply be a one-sided socialism. Those who found their hrains turned into common property would be apt to institute an inquiry why land and capital of all kinds ehould not be common property also, and if defeated in this, they would, as far as practicable, emigrate to other lands, where the righte of their brains might be respected; and the glory of England would have departed. If a simple sewing-machine produces fifty-eight millione per annum in the United Statee, what must be its value here? And what is the annual value of the steam engines, steam vessels, iron rails, iron ships, power looms, and innumerahle other things that have been called into existence hy the stimulus of patente?

But it may be argued, if this wers to go on, patentees would absorh all the wealth of the country. Successful inventors would possess the largest resources in the realm. But, alao, they would be the most enterprising. They would expend the wealth acquired hy one invention by working out new inventions without end. Progress is kept back chiefly by the poverty of inventors, and the loss of time they undergo in hunting up unwilling and incredulous capitalists.

Thers are people, and they are numerous, who have an idea that inventors are a thoughtless, wasteful race, who throw away their own property and that of their neighbours in absurd schemes. No doubt, thers are numbors of these imaginative schemers, without judgment: but what then? In other departments of life we have unsuccessful merchants, and quack doctors, and mock musicians, and mechanical pocts, and prstenders of all sorts; and why should the realm of mechanical invention be without them? The fact remains the same, that this our England waged a contest of years against the whole continent of Europe handed under the elder Napoleon, and came off victorious, the cost being mainly contributed from the earnings of the steam-engine, and spinning machinery, and power looms, and other appliances. It was Watt, and Crompton, and Hargraves, and such men, the never wearying inventors, who were at the root of the winning of tbis great fight, in the service of humanity, pulling down the false prophet who broke down old despotisms to make a worse despotism of his own.

Under heavy discouragements have they all wrought. Watt, hut for the exceptional renewal of his patent when stricken in years, would have died a pauper. But for the wealth and recognition of Boulton, the thought of his brain would never have grown to be the work of the hand, and Watt would have perished, if not unnoticed and unknown with, at best, the reputation of a "schemer," —the general term of rsproach for unsuccessful promulgators of new plans, whatover be the merits of the plans themselves.

Time was, that inventors holding patents were regarded as public enemies, and every judge on the bench thought it a trinmph when a patent was overthrown. They have lived through this, but the community owes them yet a larger measure of justice—a law court of their own, in which rapid and cheap justice may be done, in which patents may be declared valid, or overthrown, without tbe law's delay, as now practised; n which

chicanery may be abolished, and in which the poor inventor may not be overwhelmed by the long purses of the unscrupulous. The inventors do not ask any favour from the community. They pay a tax of some score thousands per annum to acquire a right in the property of their own brains, and this revenue is poured into the public treasury. They ask only that a portion of their annual thousands shall be paid as salary to competent judges, especially fitted by skill and experience to deal with questions of invention, and to strip away the fallacies with which they are surrounded by interested rhetoricians. A lawyer of unblushing front once assigned as a reason why patents should be abolished, "that inventors could no more help inventing than hens could help laying eggs," and that, therefore, the public would have the inventions without paying for them. Probably this may be true; but there is no security for their hatching their inventions, if they may be taken from them when they have arrived at chickenhood. The public is really interested in their arriving at full growth, and should therefore leave the charge of them wholly to their parents.

A patent is granted for three years on the payment of 25*l*., for seven years for 75*l*., and for fourteen years for 175*l*. Now it is notorious that scarcely any patent gets into use under seven years, and in many cases the fourteen run out without return. Why should not the inventor have the right instead of the favour of renewal, for another payment at the end of the fourteen years? And if the renewal is to be made a question of specific profits as royalty, why should it be left at an arbitrary amount, depending on the opinions of gentlemen perhaps not conversant with the subject? Why should there not be some mode of calculation analogous to payment for vested interests? If it can be demonstrated that the public gain a million a year by an invention, why should not the inventor obtain a small per-centage during a prolonged period in his life-time? If one man combines a number of words in the form of a hook, he obtains a per-centage for its use, fixed by himself or his descendants for three generations. Why should not an inventor have a claim for a longer or shorter period for a combination of mechanical principles? It may be said, that he shuts out the public from their free use. Not so: his reward will only serve to stimulate others to make new combinations, in which case competition brings down the per-centage. The world gets a hundred new inventions by the process of fairly rewarding one, and stimulating the rest. Stop property in inventions, and trade societies will immediately arise, and manufacturers will pass their time in trying to steal each other's secrets, as the American cotton planters stole the cotton gin of Eli Whitney, and thereby defeated his patent.

Even now, the stitching-machine is paling its power, and other machines are planning, that shall give us cloaks, and tunics, and trousers free from seams. The tailor (*tailleur*), or figure studier, will become the manufacturer's artist to design for him so many sizes and proportions, as will take in the whole human race; and stitches, as we now understand them, will cease to be an integral part of men's garments. Fashion changing from month to month may continue to prevail with those who have a passion for mere change, and money in abundance to pay for it; but the great mass of manhood, including the Volunteers, will be as gracefully clad as the succinct or draperied Greeks of old, with their clothing prepared for them by machines instead of by human slaves.

What possible harm could result to a nation, though the inventor of each machinery should obtain a million instead of a thousand pounds for his reward? By the sweat of the brow shall the sweat of the face be dried up, and human drudgery be lessened. There are many more thoughts in the human brain than have yet come out of it, and the nation that can most intelligently recognise the value of originality by removing obstacles from the path of originators, will—other things being equal—wield the greatest amount of power.

W. Bridges Adams.

PIPES OF PAPER.

MANY are the uses to which the generic name of pipe applies. Water pipes, gas pipes, sewer pipes, drain pipes, warming pipes, ventilating pipes, organ pipes, medical pipes, blowpipes, reed pipes, tobacco pipes, pipe sticks, petticoat piping, and the pipes that Tom Pipes, one of Smollett's heroes, played on as boatswain. My present dealing is with water pipes, which, after ranging through many varieties of material, are now being constructed of—paper.

Our earliest pipes for water were made of lead, like the bullets in the nursery ballad, from facility of manufacture, but necessarily they were of small size, owing to their facility of collapse. When the early water companies first laid pipes for general supply under the surface of the streets of London, no better materials could be found than the bolls of trees—birch and elm being the favourites,—which, in lengths of nine to twelve feet, were bored out to a diameter of about six inches,—one end hooped, and the other trimmed conically, so that each joint resembled the connection known as "spiget and faucet." Extraordinary was the duration of these pipes, but they ultimately went out of use because their diameter was unequal to the constantly increasing supply demanded by the public.

And so water engineers took to cast-iron as the next material. The announciation of this called forth many denouncers of the unheard-of newfangled novelty, amongst all classes, but more especially amongst the washerwomen, who beheld therein the downfall of their trade from the universal iron-moulding of every article of personal, bed, or table, apparel. But the engineers persevered, and the soap-bubbles burst, which was not the case with the pipes. Cast-iron pipes then became an enormous manufacture, and were the subject matter of many patents, the problem being how to cast them thinnest, while containing the requisite strength. In their application to rain-water purposes, where no pressure had to be guarded against, marvellous was the thinness achieved—so thin that they seemed to be formed of two thin skins with nothing between, sometimes disintegrating in the acidulated smoke atmosphere of London in the course of two seasons. A new difficulty in the foundry was to keep the core central, so as to preserve an equal thickness of the metal,—a difficult thing, when the total thickness was less than the eighth part of an inch. One inventor resorted to a plan of forming these pipes without central cores, substituting for them a violent whirling movement of the mould, whereby the molten metal was flying by centrifugal action against the sides of the mould. But it does not appear to have been successful on the large manufacturing scale.

In France "iron is iron," and every kind of scheme, save importing it from England, is resorted to to economise its use. So a certain M. Chameroy invented a plan of making water pipes of thin sheet iron, rivetted together like the funnels of common stoves. The insides he coated with mineral pitch to a beautifully smooth surface, and the outside with the same pitch mixed with small gravel pebbles. The iron was thus hermetically sealed against the action of oxygen. On each end of each pipe was cut a screw, one male and the other female, and they were connected just like wrought iron gas tubing. Pipes of this description have been in use in Paris for many years, successfully. But want of stiffness to prevent collapse is a practical difficulty, unless for small uses.

In England the system of "pot pipes," or pipes of earthenware, have been largely introduced for drainage purposes. These pipes will stand sufficient pressure in each length, but they cannot be

made in greater lengths than two feet, and the consequent increase in the number of joints is a great difficulty. But, apart from this, a very slight sinking of the ground is sure to break them at the joints by an internal leverage pressure, independently of the pressure of the fluid. The same difficulty occurs with the glass pipes which have been attempted. In fact, a permaneut pipe cannot be made of brittle material, and its brittleness is one very serious objection to cast-iron, apart from the consideration of its objectionable weight in transport. In streets vibrating beneath rolling carriages, cast-iron pipes frequently break, and it has been stated, that in the Australian Waterworks, the breakage in transport and allocation has amounted to as much as from twenty to twenty-five per cent., a very serious addition to the cost.

Impressed with these serious difficulties, M. Julourean, of Paris, has hit upon a new material, which, it is stated, can be sold at half the price of cast-iron, for equal capacity, while it is less than one-sixth the weight. He makes a pipe resembling those of M. Chameroy in the system, of bituminous lining inside and out, but the case, instead of being of sheet-iron, is of paper, which, being saturated with hitumen, is rolled up in the form of a hollow cylinder, fold on fold, till it has attained a thickness of about three-eights of an inch.

On the 19th of January, of this present year, a number of engineers were got together at the base of the Westminster Clock-tower, the scene of Mr. Denison's bell craft, and there a variety of these pipes—measuring from two and a-half to seven inches internal diameter, and five feet in length — were subjected to hydraulic pressure, tested by one of Bourdon's guages, of 220 lbs. to the square inch, equal to a column of water about 500 feet high, and this pressure they sustained without any damage. This is more than the pressure that common cast-iron pipes will sustoin, and it was stated that it required 330 lbs. to the inch to burst them. On testing the power of a two and a-half inch pipe to bear a transverse strain, a very satisfactory result was attained, and upon shivering a piece with a sledge-hammer it appeared that every fold of the paper was separate, and retained considerablo fibrous strength, notwithstonding the heat of the hitumen it had been exposed to in the process of manufacture.

The source of strength in this arrangement is found in the fact that the pressure increases the contact of the folds of the paper, making every fold bear an equal strain like the wire-folded gun of Mr. Longridge, or the silk-folded guns of the Chinese. The adhesion of the separate folds may be illustrated hy the mode in which a Thames steamer is held fast to the pier by two turns of a rope round tho timber bit, by which means the friction enables a single man to control the movement.

These pipes will be less subject to the action of frost than metal is; and although they are not yet tried in large sizes, and the requisite thickness for that purpose is not yet known, it is possible that they will come largely into use for moderate sizes, and also for small service pipes to replace lead at a very far less cost than gutta percha.

The severe frost last winter, hursting our water-pipes and driving us to stand-cocks in the streets, was not creditable to us, as a mechanical nation, in its results upon our domestic water supply. There exists so simple a mode of preventing water-pipes in houses from bursting by frost, that I suspect the plumbers must be aware of it, and keep it carefully out of sight. It is to have a small spherical cistern of thin copper attached to the lower part of the water-pipe, and a gas-burner fixed below it. If, when the frost comes on, the gas-jet be lighted, the effect will be that the cistern will become a boiler on a small scale, circulating sufficient warmth through the pipes to prevent the action of the frost either in stopping the supply or in bursting the pipes. Every household might be saved from winter's mishap in this simple mode, without the unsightly process of hay-handling its service pipes.

Some objection has been raised about difficulty in bending for curves, but without apparent reason. These pipes may be made in curved forms as easily as cast-iron; or, hy filling with sand and heating, they may be bent like a malleable metal pipe. Their stiffness, and freedom from decay, ronders them peculiarly eligible for the purpose of draining the permanent way of railways. Whether any better material will ultimately be discovered it is difficult to prononce; but, so far as judgment goes, and experieuce has verified, a new era appears to have been attained in pipe making. The strength of the material has long been proved in the familiar instance of rocket cases, where tho enormous pressure of the powder is so successfully resisted by simple concentric folds of paper.

Just at this time, Mr. Gladstone's alteration of the tariff opportunely arrives to facilitate a new manufacture, openiug up also new sources of material.

W. BRIDGES ADAMS.